

Altair

Subject:

7th Combined Science

Class: ECOLOGY

Date: August 12th
2011



Teacher's notes

Objectives

Vocabulary

Link and Learn

Prepared by

7th Grade A - Ecology

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Questionnaire - Notebook

Copy and solve these questions in your notebook.

Present it on Friday, August 19th.

1. What is Ecology?
2. How are Cycles in Nature related to living things?
3. Describe two cycles in nature that are related to plants.
4. Describe three definitions discussed in class that help you understand Ecology.
5. How can you take good care of ecosystems? Mention two concrete examples where you and your family can participate.
6. Why oil spills in the ocean affect living things?
7. What is bioremediation?

**Let's remember previous
learned concepts...**







New knowledge beginning...

Natural Cycles

- Many materials on earth are used and then reused by living organisms.
- Earth also stores some materials for later use.

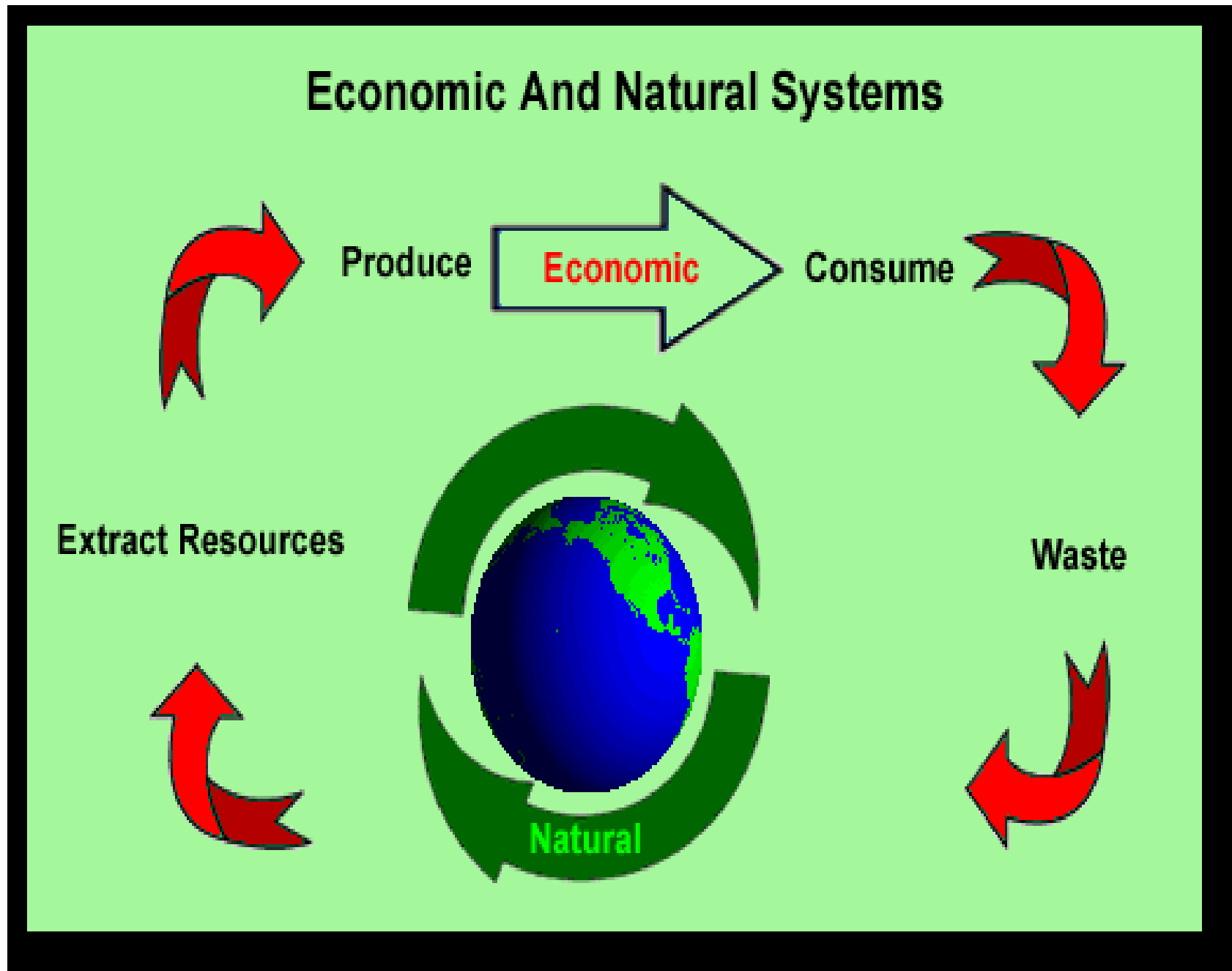


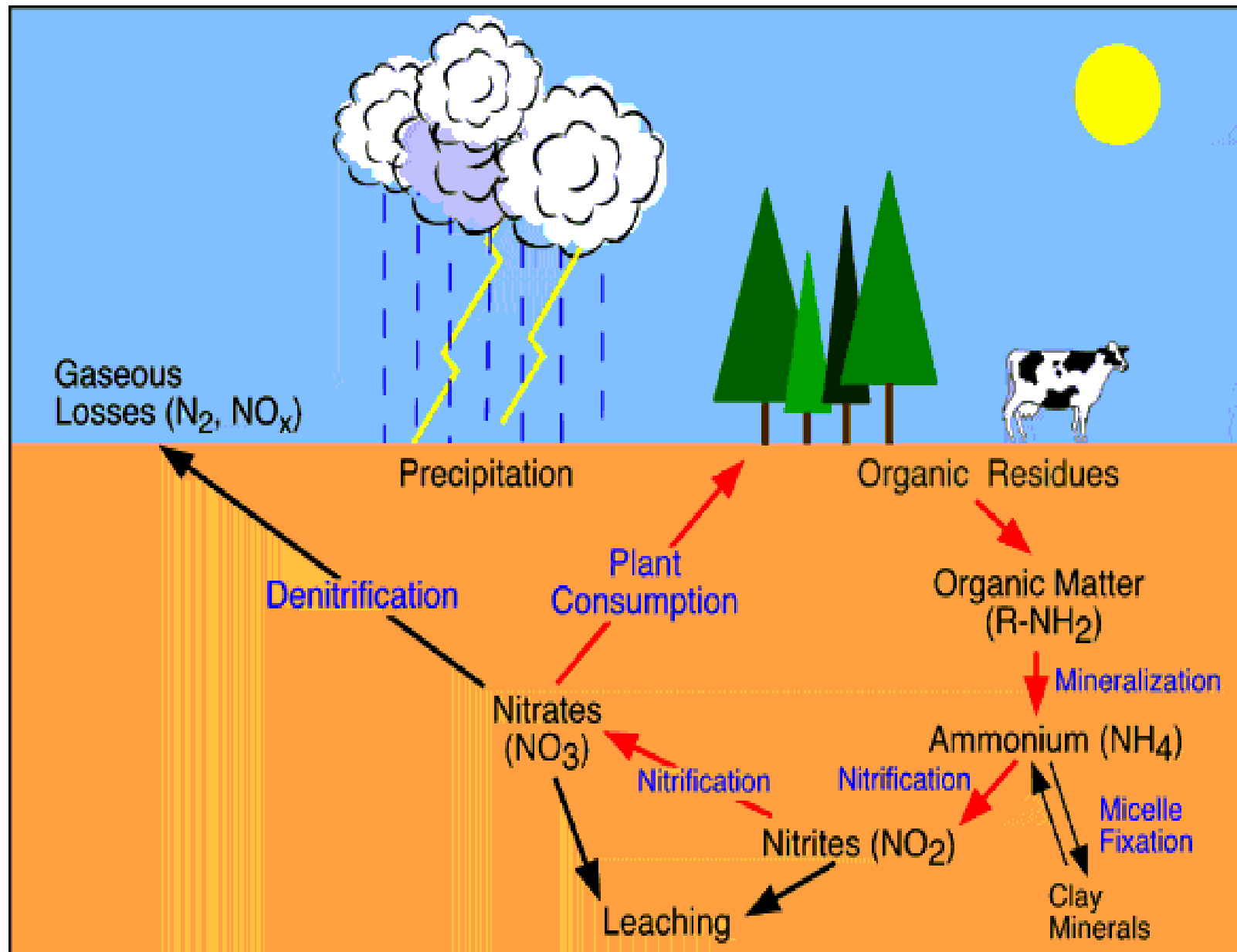
When an animal drinks water, it gets some of the materials it needs. Animals also get release materials into the environment in their wastes.



Plants get the materials they need from the soil and from the air. Plants release some materials into the environment during photosynthesis.

- When plants and animals die, their bodies decay. This releases more materials into the environment.
- The cycles continue as new plants and animals use these materials.





The Nitrogen Cycle

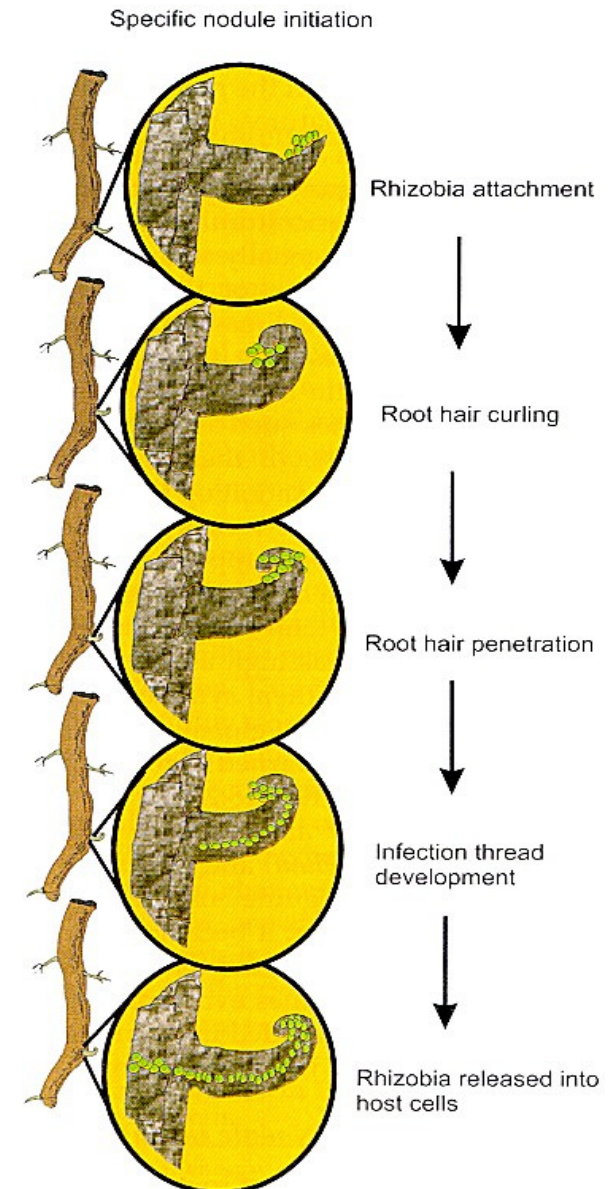
- All living organisms need nitrogen. Plants make proteins from nitrogen in the soil.
- Animals get the nitrogen they need to make proteins when they eat plants or other animals that eat plants.
- Earth's atmosphere is 78% nitrogen. But nitrogen cannot be used in this form by most organisms.

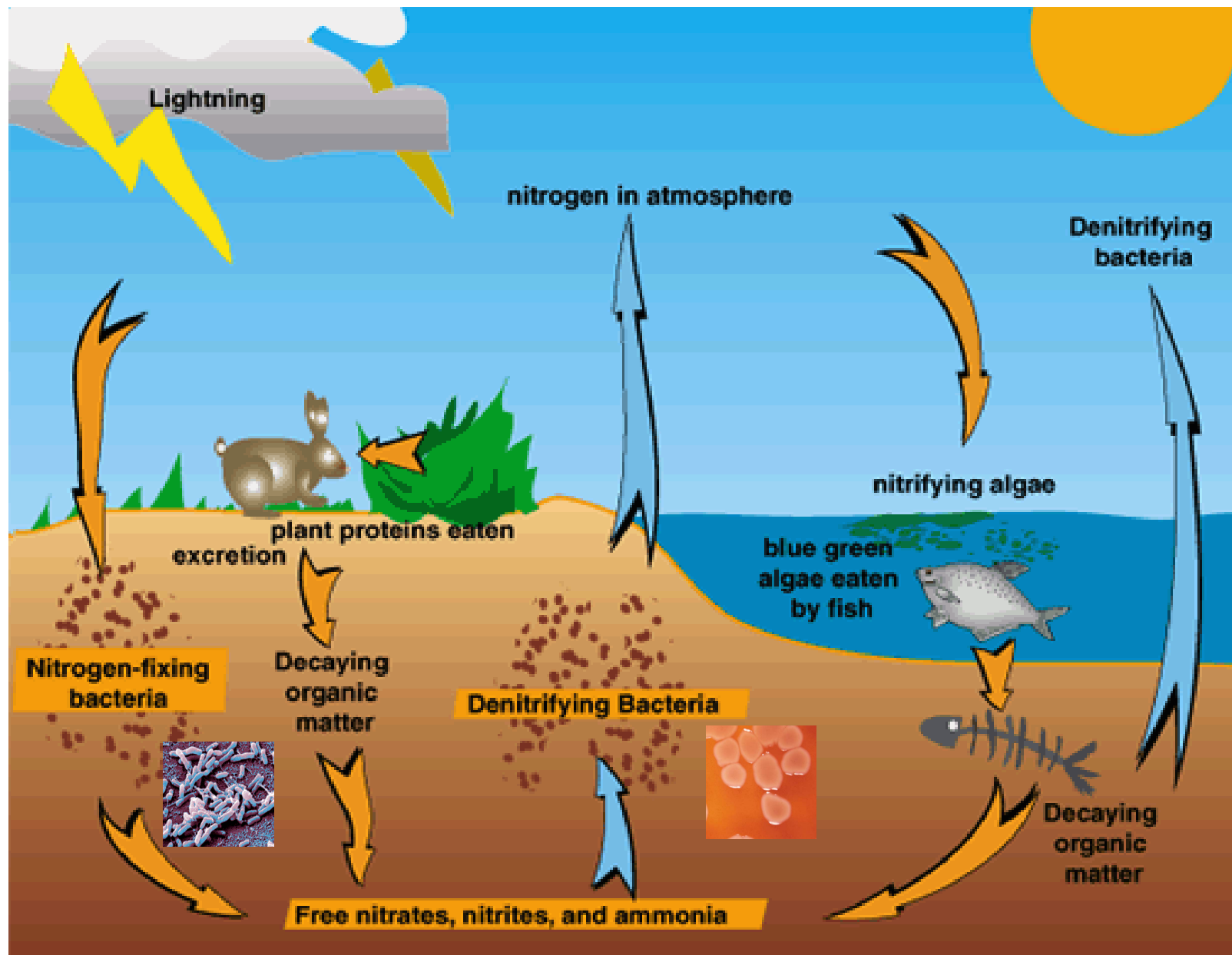
So, how does a plant obtain Nitrogen from the environment?



Nitrogen Fixation

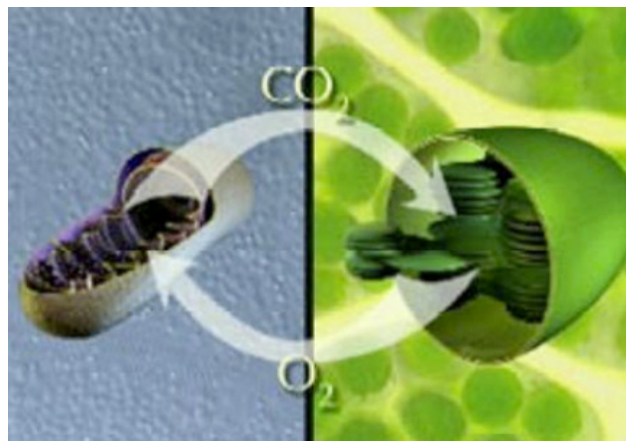
- In the *Nitrogen cycle*, nitrogen gas is *fixed*, or changed into forms of nitrogen that plants can use. These forms are *nitrates* and *ammonia*.
- Bacteria in the soil and in the roots of certain plants fix most of the nitrogen gas, the other part is fixed by lightning.
- Nitrates and ammonia are returned to the soil in two ways: 1st, they are returned through animal wastes (solids); 2nd, when animals and plants die, bacteria release nitrates and ammonia from decaying protein.

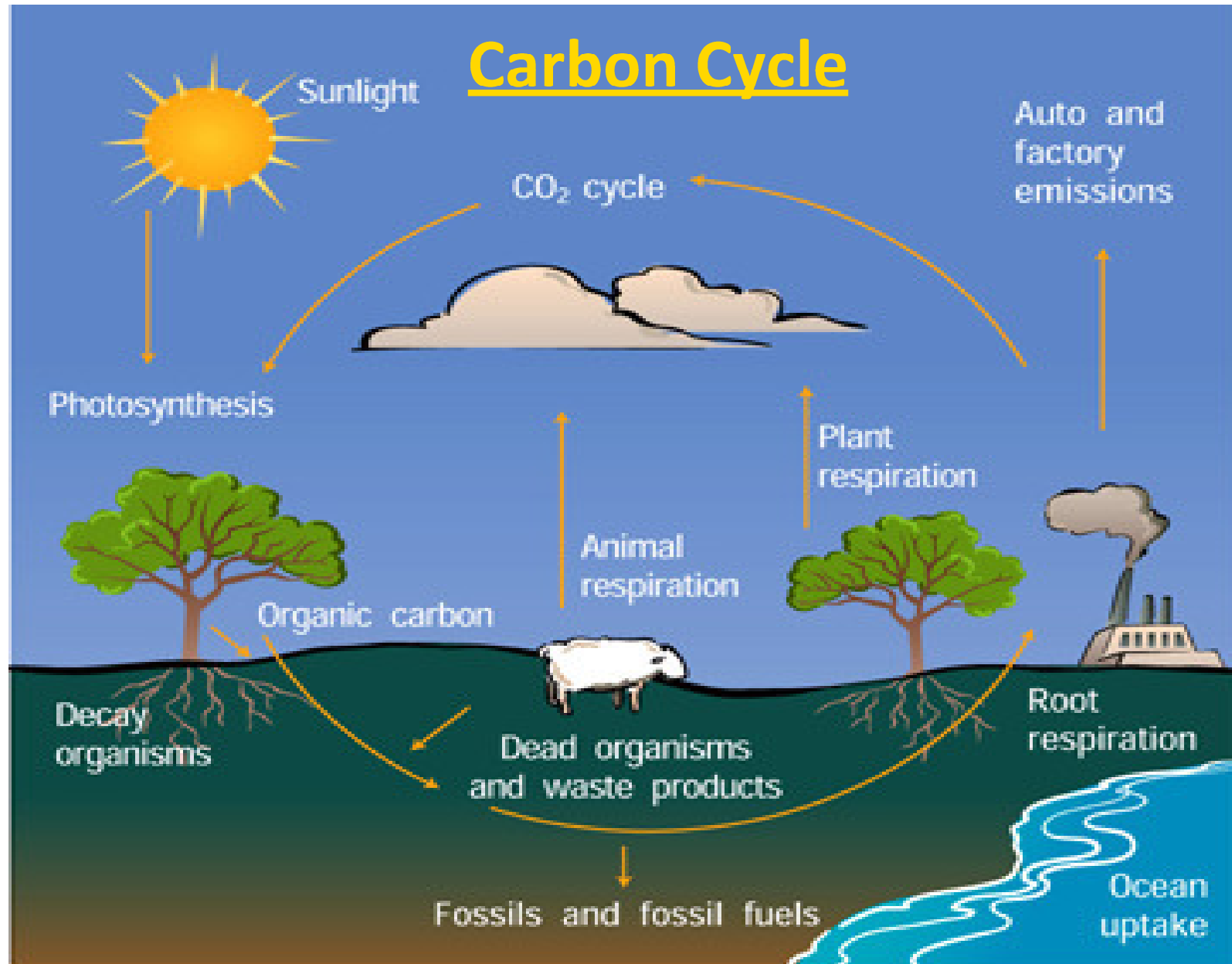




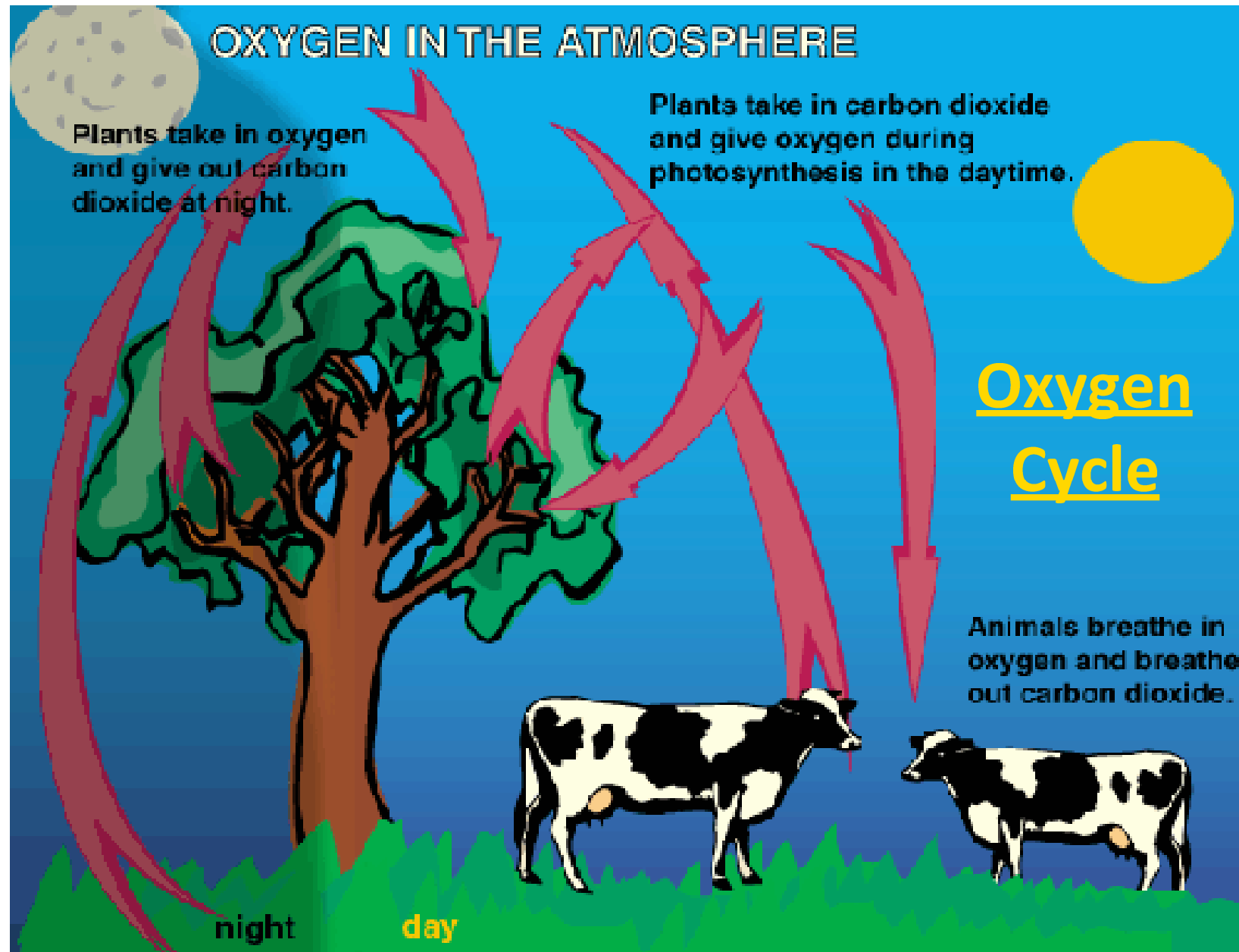
The Carbon-Oxygen Cycle

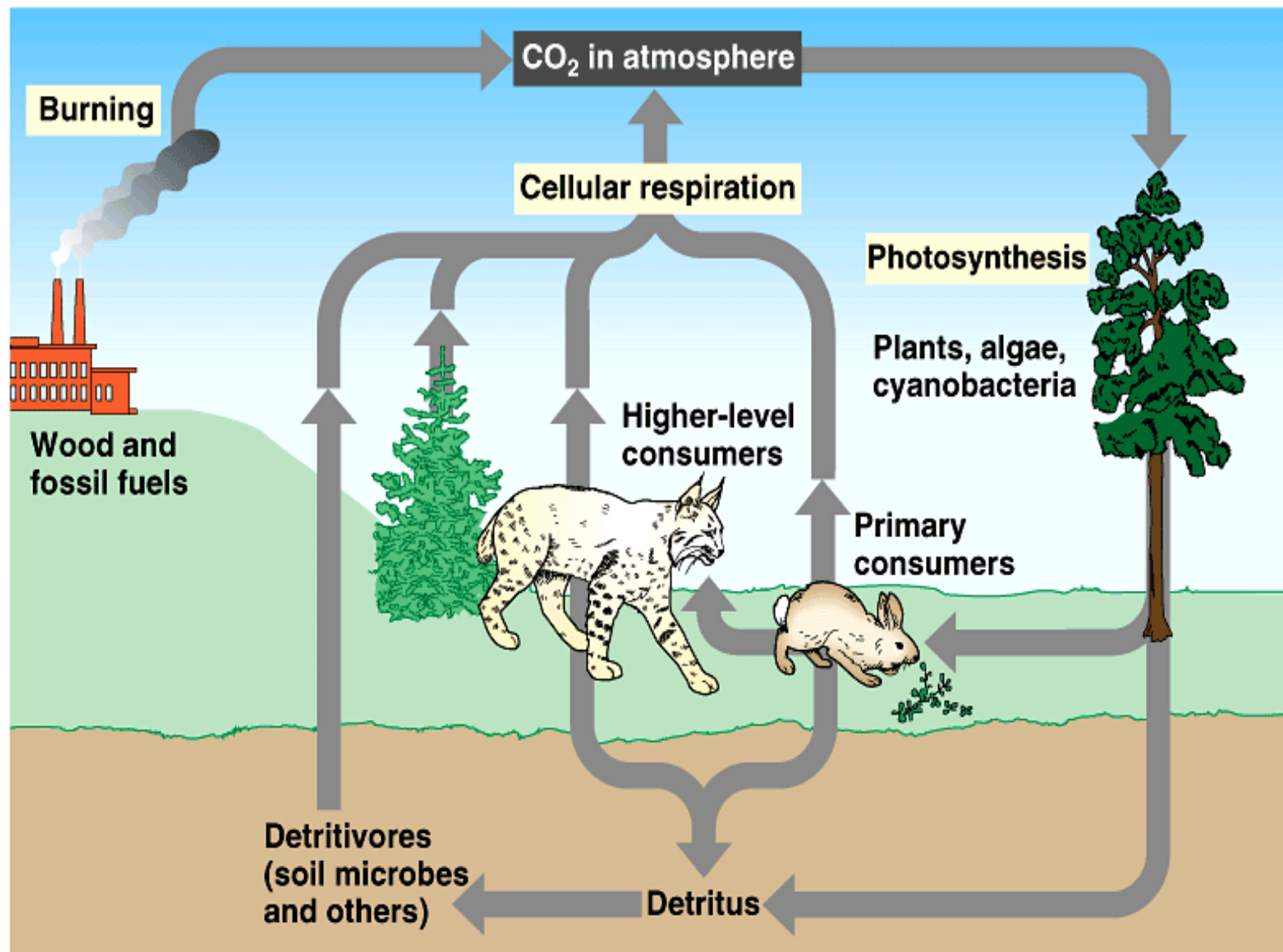
- All life on Earth is involved in this cycle because carbon and oxygen make up most of the bodies of all living organisms.
- This cycle depends on two processes: *Photosynthesis* and *Cellular Respiration*.
- During *Photosynthesis*, plants and some other organisms take in carbon dioxide (CO_2) from the air or the water, and using energy from the sun, the carbon is turned into food, and oxygen is released into the environment.
- This carbon is stored in plants, or passed along to animals that eat plants.
- *Cellular Respiration*, is the process that releases energy from food. During respiration, oxygen is taken from the air or water, and carbon dioxide is released into the environment.







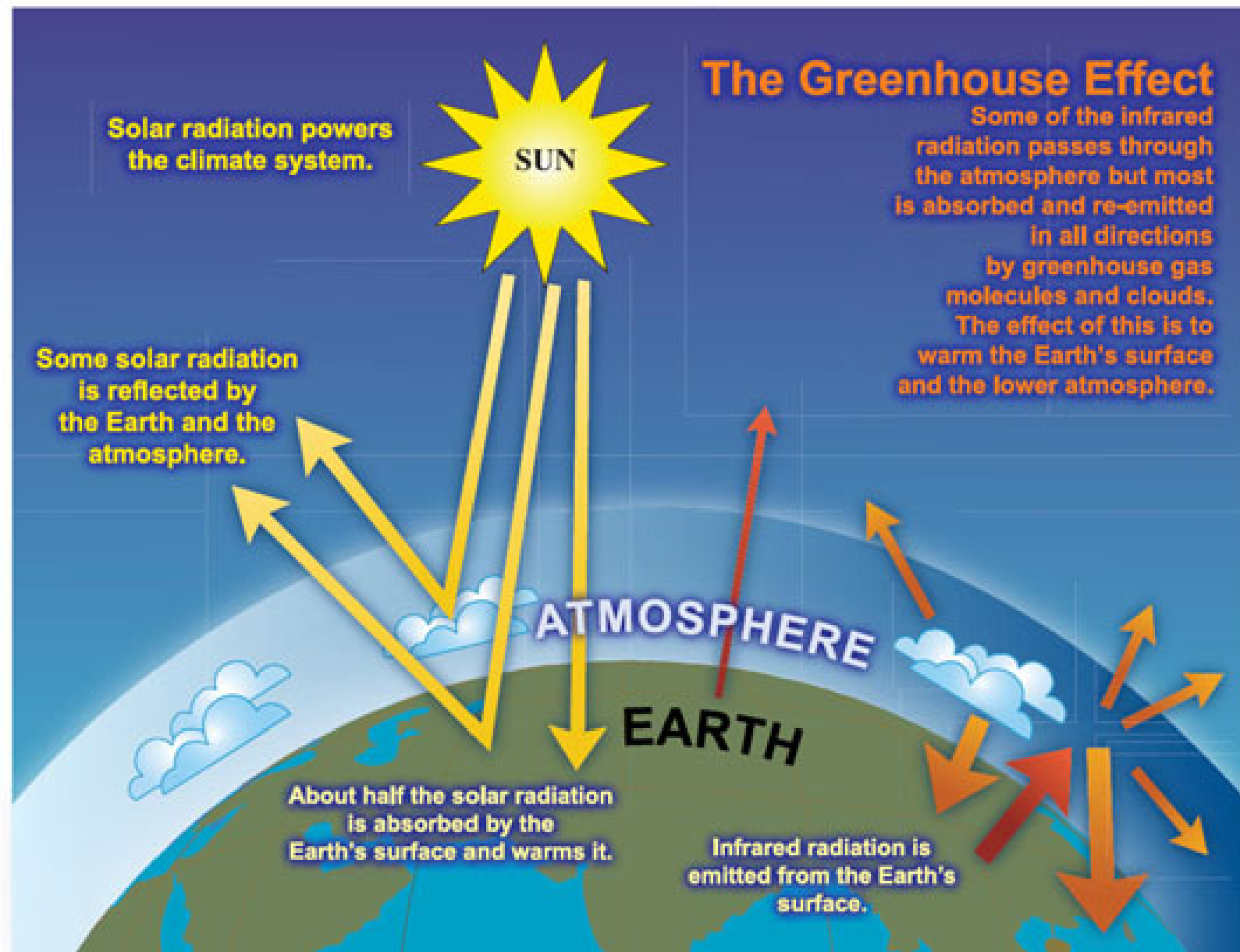




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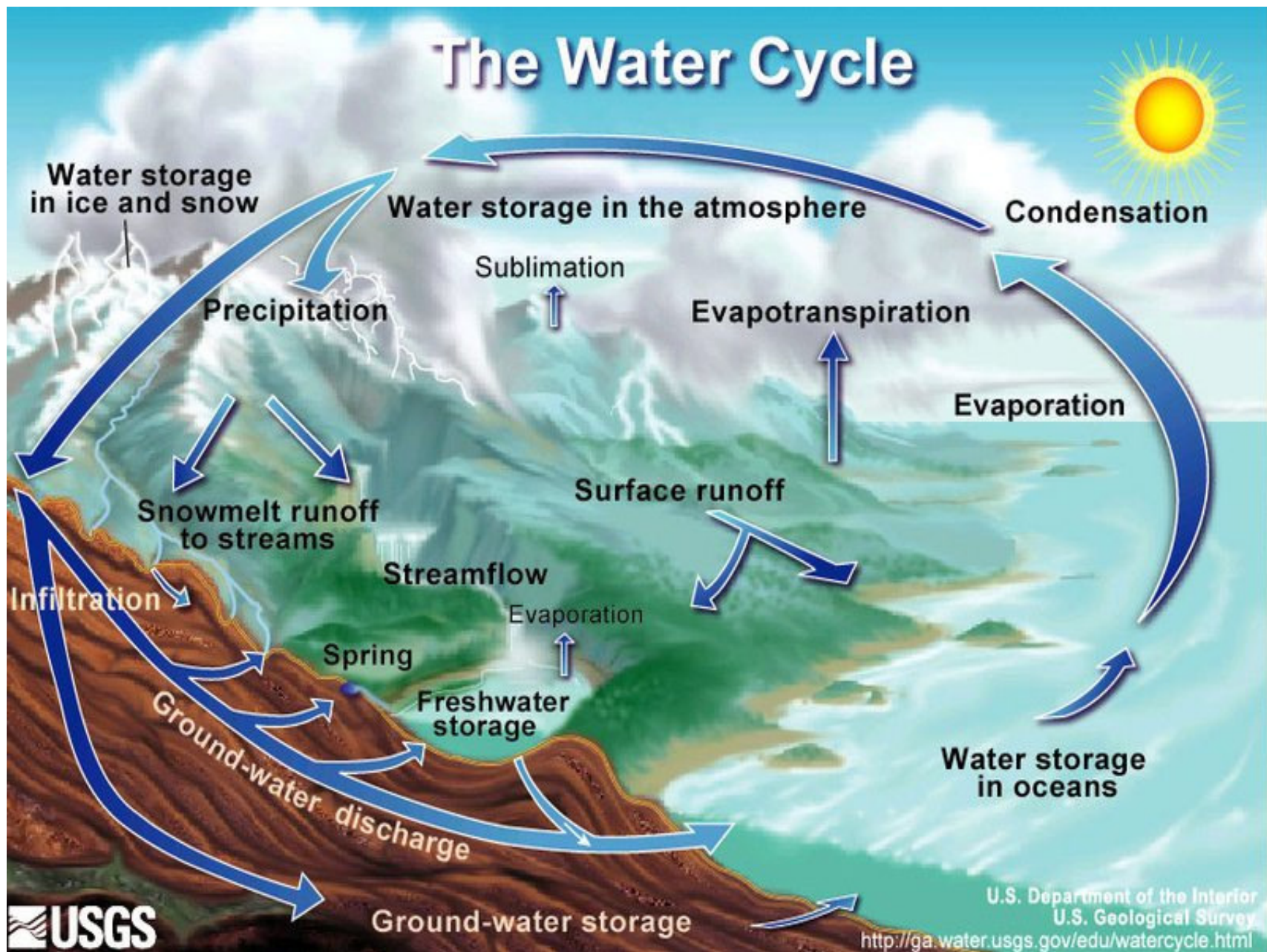
Tipping the Balance

- For hundreds of millions of years, the carbon-oxygen cycle stayed in balance, mostly by the process of photosynthesis and respiration.
- However, since the beginning of the Industrial Revolution, about 200 years ago, human activity has started to change the balance.
- During the Industrial Revolution, humans began to use fueled machines and factories that consumed lots of fuels.
- Large areas of forests were cut for timber uses, and the burning of wood and coal put tons of carbon dioxide into the air each year.
- Adding carbon dioxide to the air is a problem, because it is poisonous to animals.
- And cutting trees (plants) decreases the possibility to reduce the amount of carbon dioxide from the environment.









The Water Cycle

- Seas, oceans, and rivers cover about 75% of Earth's surface. Earth's water moves through the environment in the ***Water cycle***.
- The heat of the sun changes water on Earth's surface into water vapor. This process is called ***evaporation***.
- The temperature of the air high above the Earth is cold. There water vapor changes back into liquid water through a process called ***condensation***.
- Any form of water that falls from clouds is called ***precipitation***.
- Animals and plants also put water back into the environment. Plants give off water through their stomata, this process is called ***transpiration***.
- Animals give off water vapor from their lungs when they exhale. And most of the urine animals produce is water.

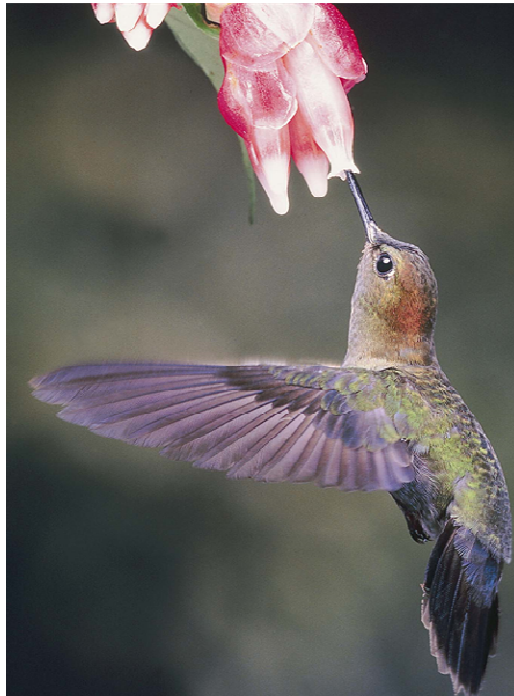


Humans and the Water Cycle

- All the water on Earth today is the same water that was here billions of years ago.
- Yet every year the need for water grows.
- About 97% of all Earth's water is ocean water (salty), and only 3% is freshwater (rivers, lakes, lagoons, etc).
- Less than 1% of the freshwater can be used because most of it is frozen in ice caps and glaciers.
- Yet the limited sources of freshwater are sometimes affected by human activities, such as: chemicals on the ground (wash off), and air (acid rain), etc.

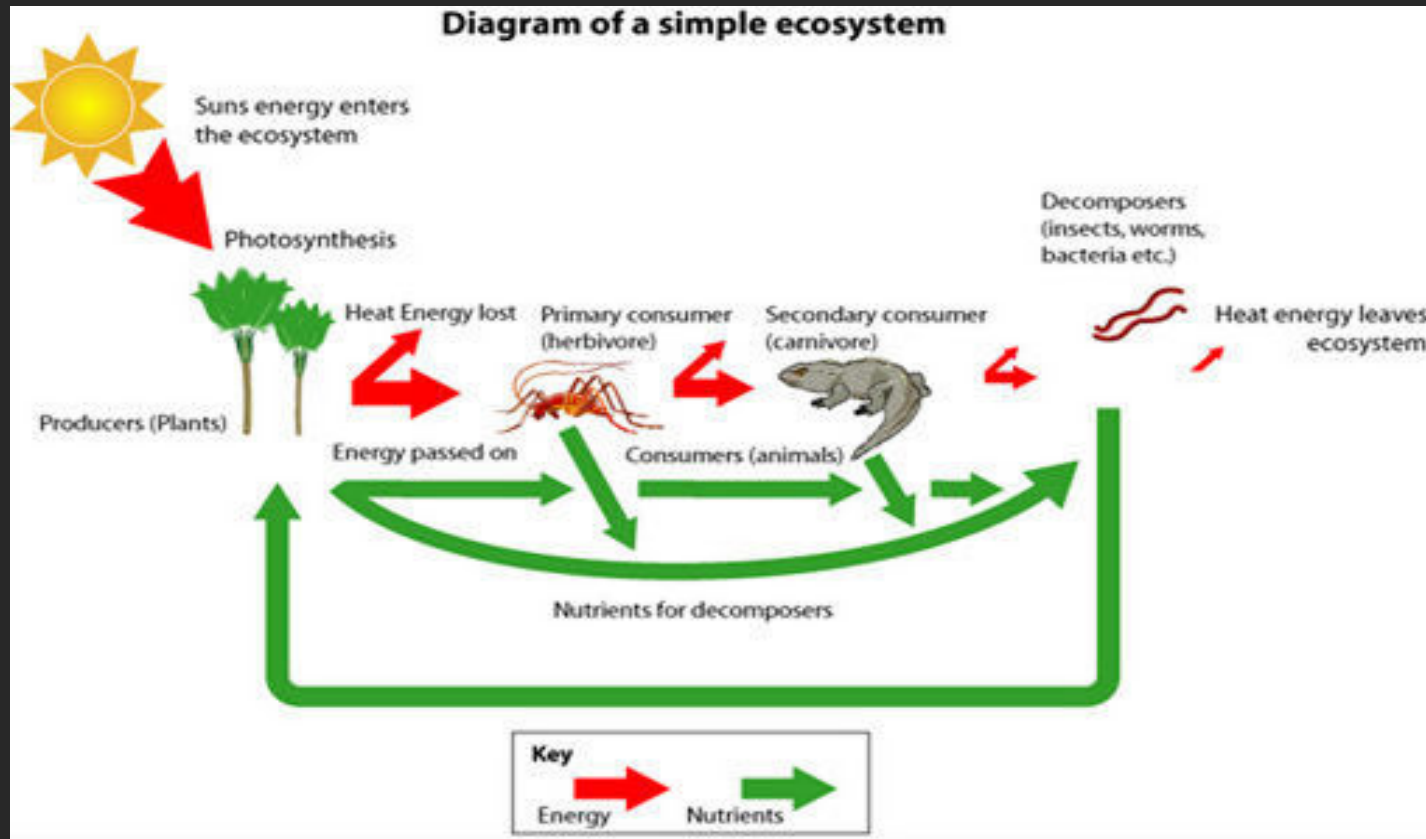


Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999.



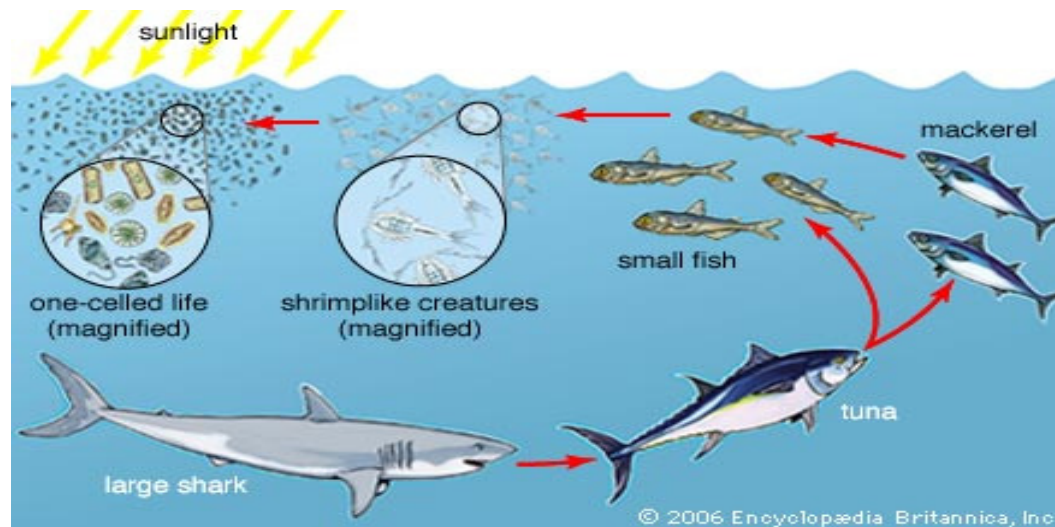
Organisms and their Environment

- All living organisms meet their needs in the physical environment they live in which includes all the nonliving things in an area, such as: soil, weather, landforms, air, and water.
- A single organism in an environment is called an *individual*. Individuals of the same kind living in the same environment make up a *Population*.
- All the populations of organisms living together in an environment make up a *Community*. A community may include many different populations, each community interacts with its physical environment.
- Together, a community and its physical environment make up an *Ecosystem*.



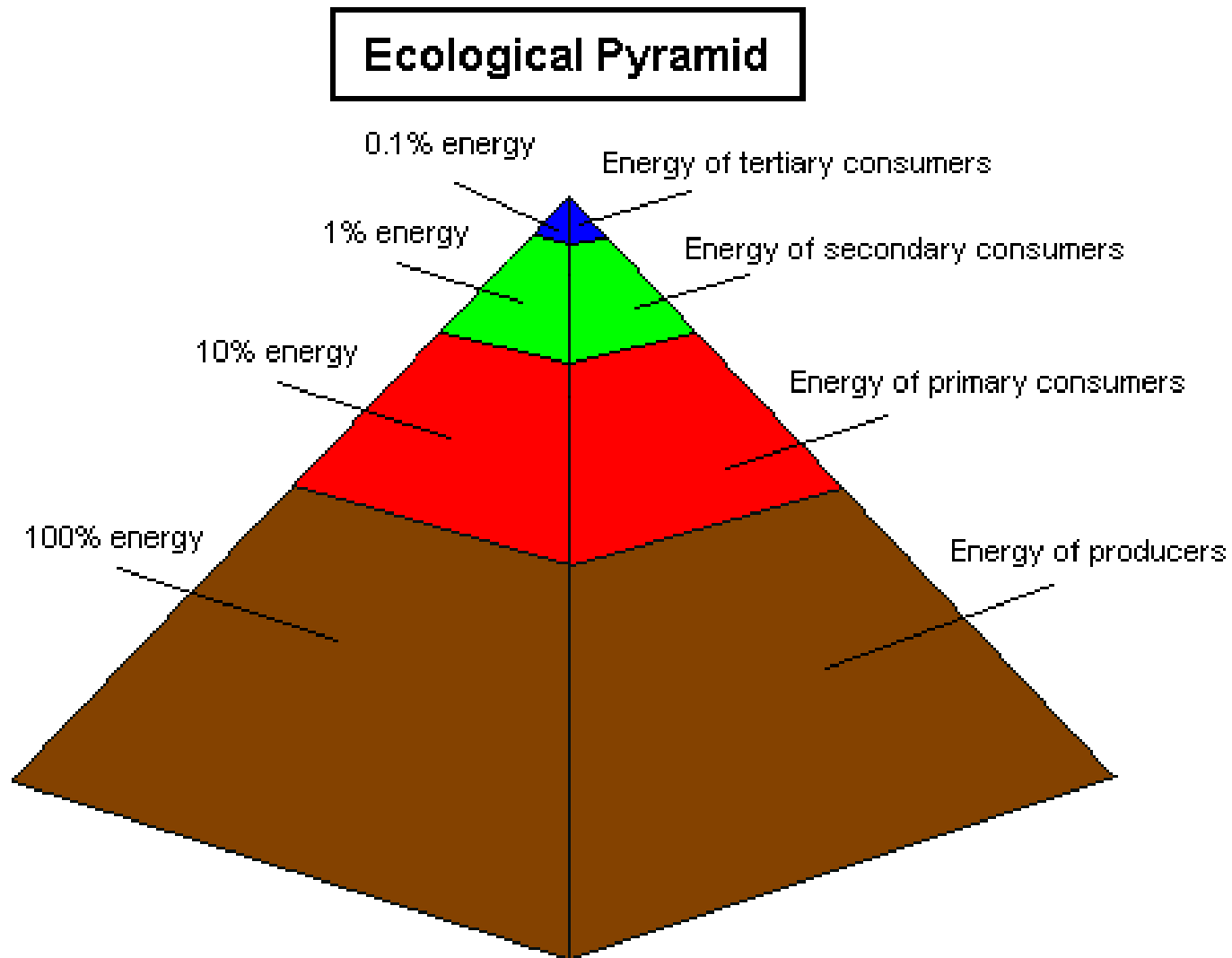
Habitats and Niches

- Every population has a place where it lives in an ecosystem, this is its *habitat*.
- Many different populations can share a habitat. But each population has a certain role, or *niche*, in its habitat.
- In a healthy ecosystem, populations are interdependent, that is they depend on each other for survival.



Limiting Factors

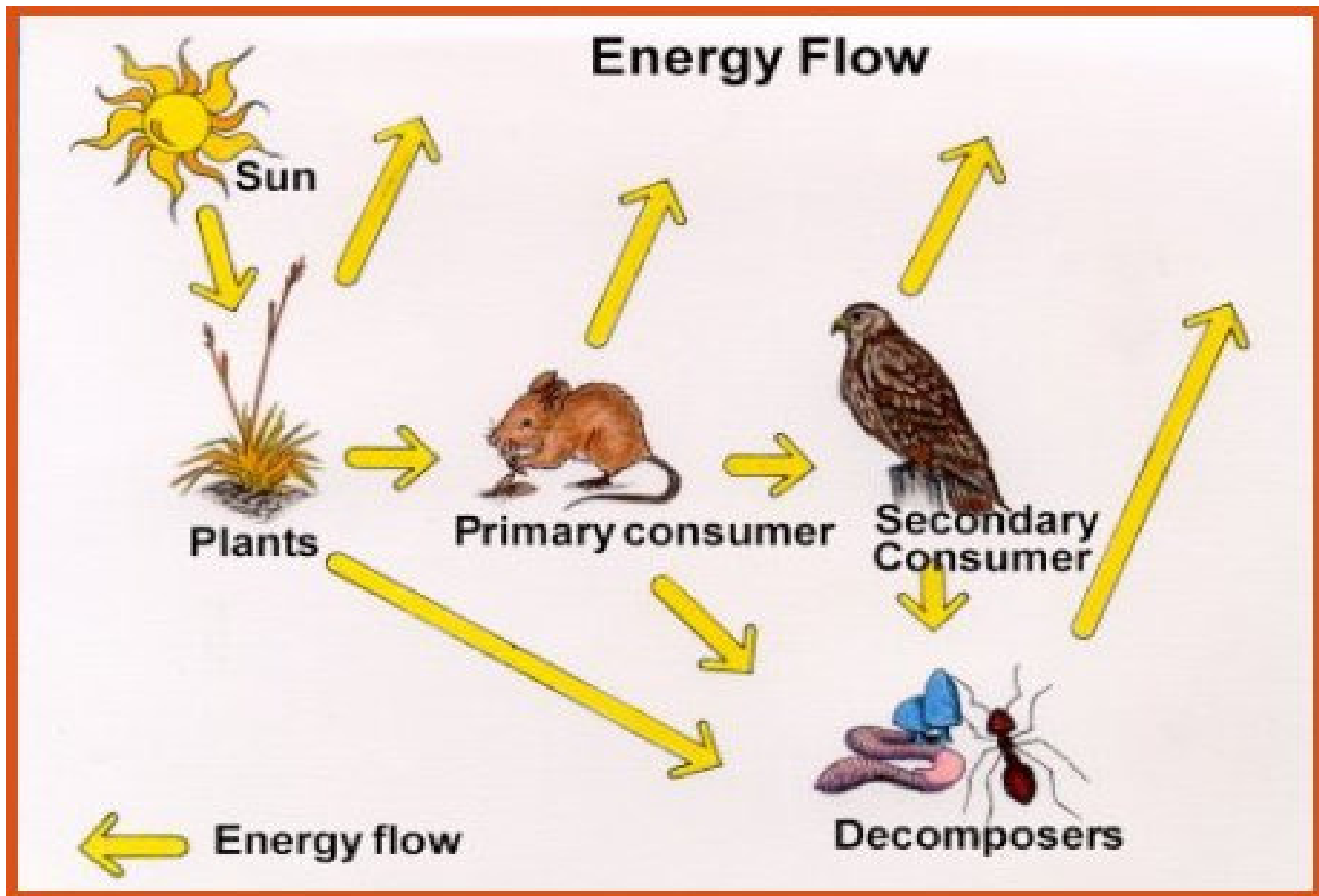
- The environment largely determines what type of ecosystem will develop in an area. Soil conditions, temperature, and rainfall help determine what plants will grow.
- The kinds and numbers of plants in an ecosystem determine what animals will live there.
- The amount of food, or any limited resource, in an ecosystem affects the size of a population.



Transfer of Energy in an Ecosystem

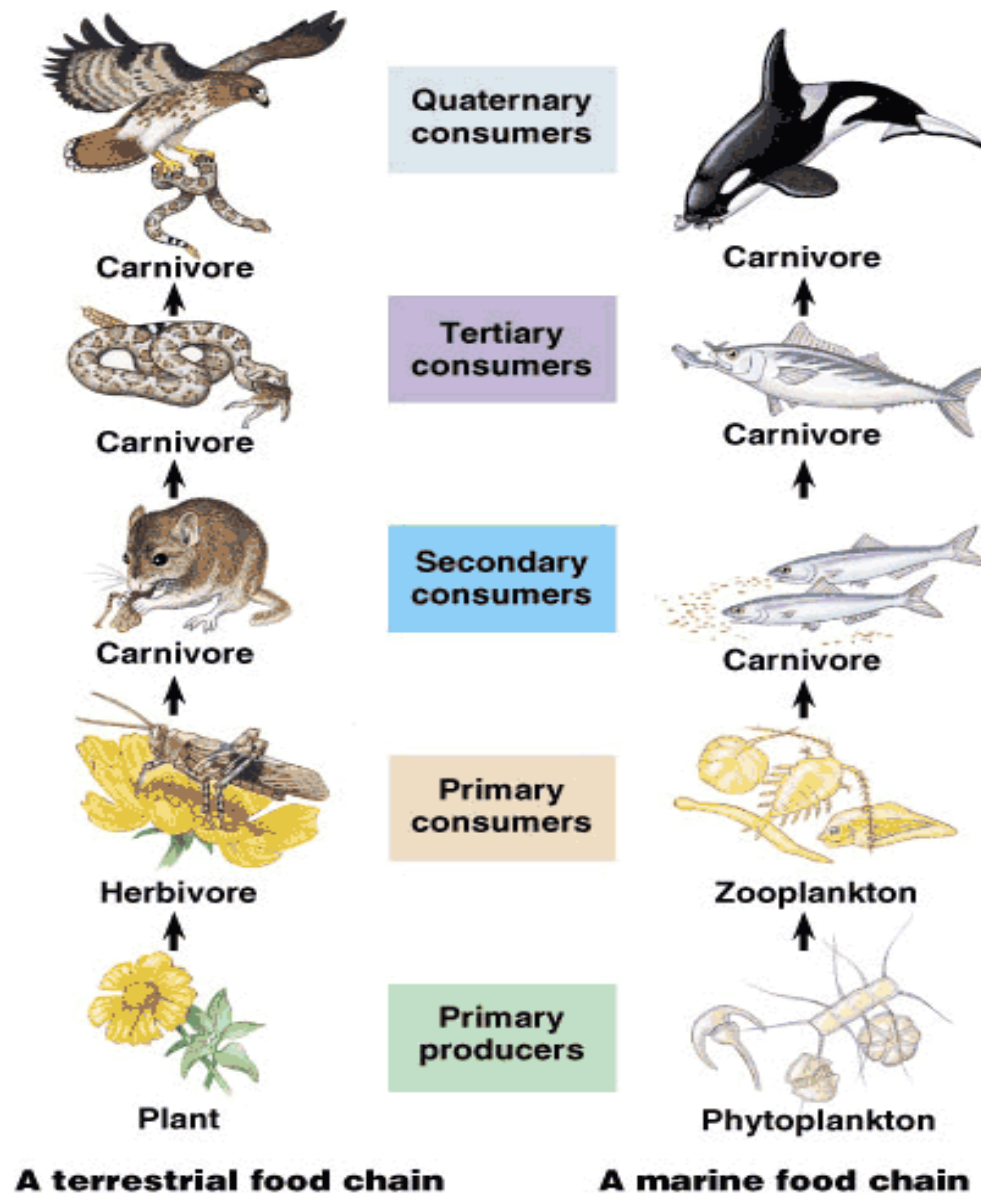
Living Things need Energy

- The sun provides the energy for almost every ecosystem on Earth.
- Plants, or *producers*, use sunlight to make the food they need from carbon dioxide and water.
- All other organisms in an ecosystem community must eat to get energy they need. So the animals in a community are *consumers*.

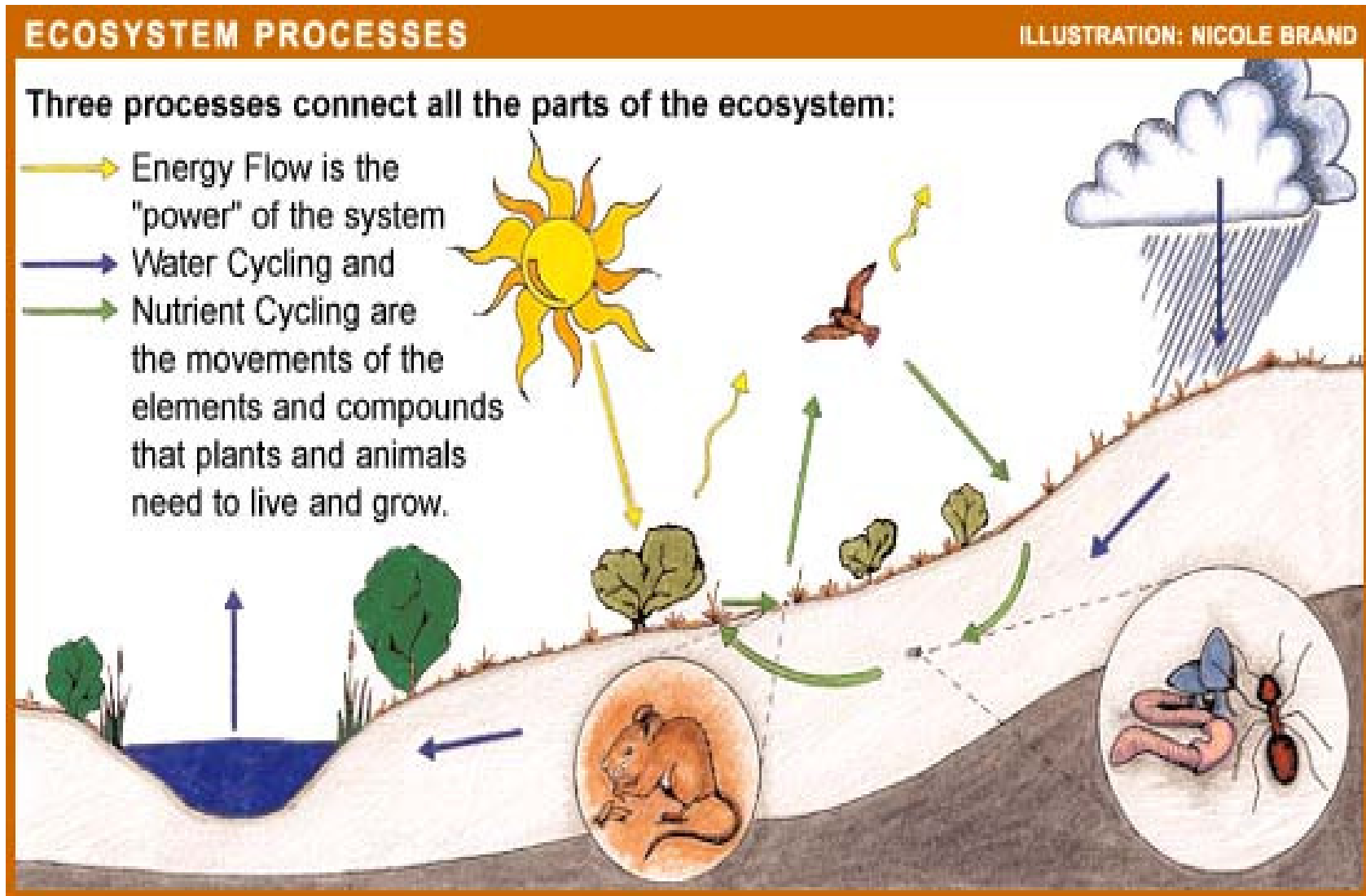


Food Chains

- Energy is passed through communities by way of food chains.
- A *food chain* shows how the consumers in an ecosystem are connected to one another according to what they eat.
- A food chain has several levels.
- At the base of every food chain are the *producers*, usually plants.
- Primary consumers, called *herbivores*, or plant eaters, eat the producers.
- Secondary consumers, called *carnivores*, or meat eaters, eat primary consumers.
- Tertiary consumers eat secondary consumers.



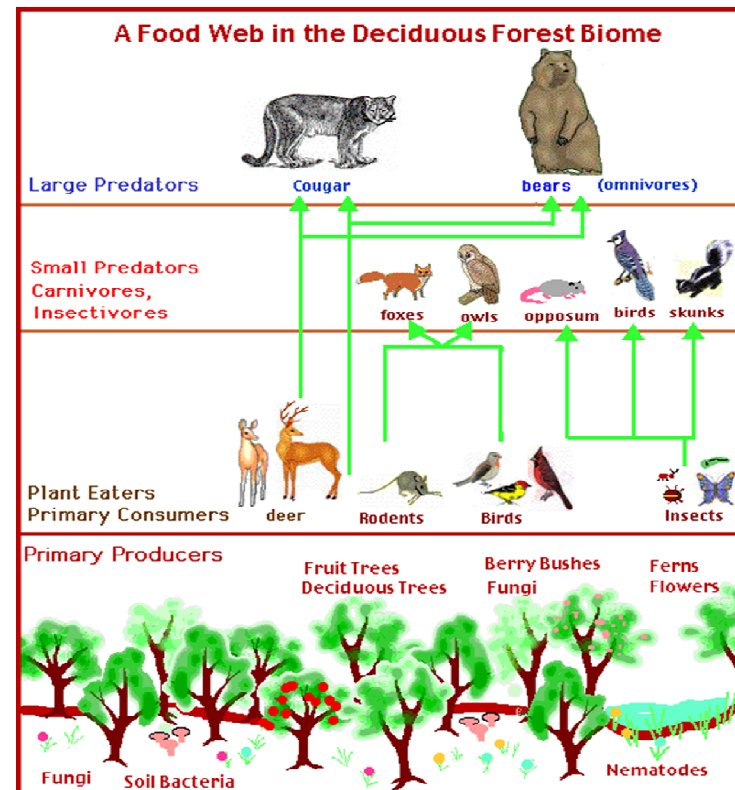
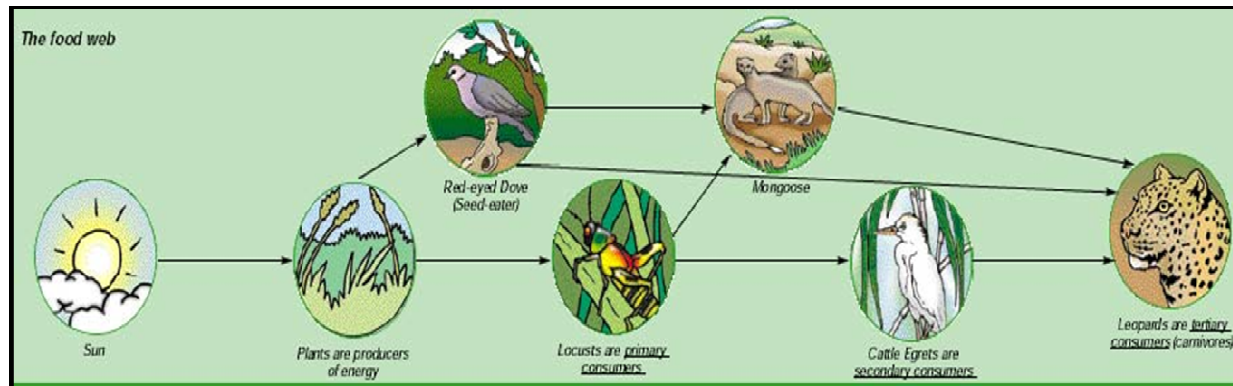
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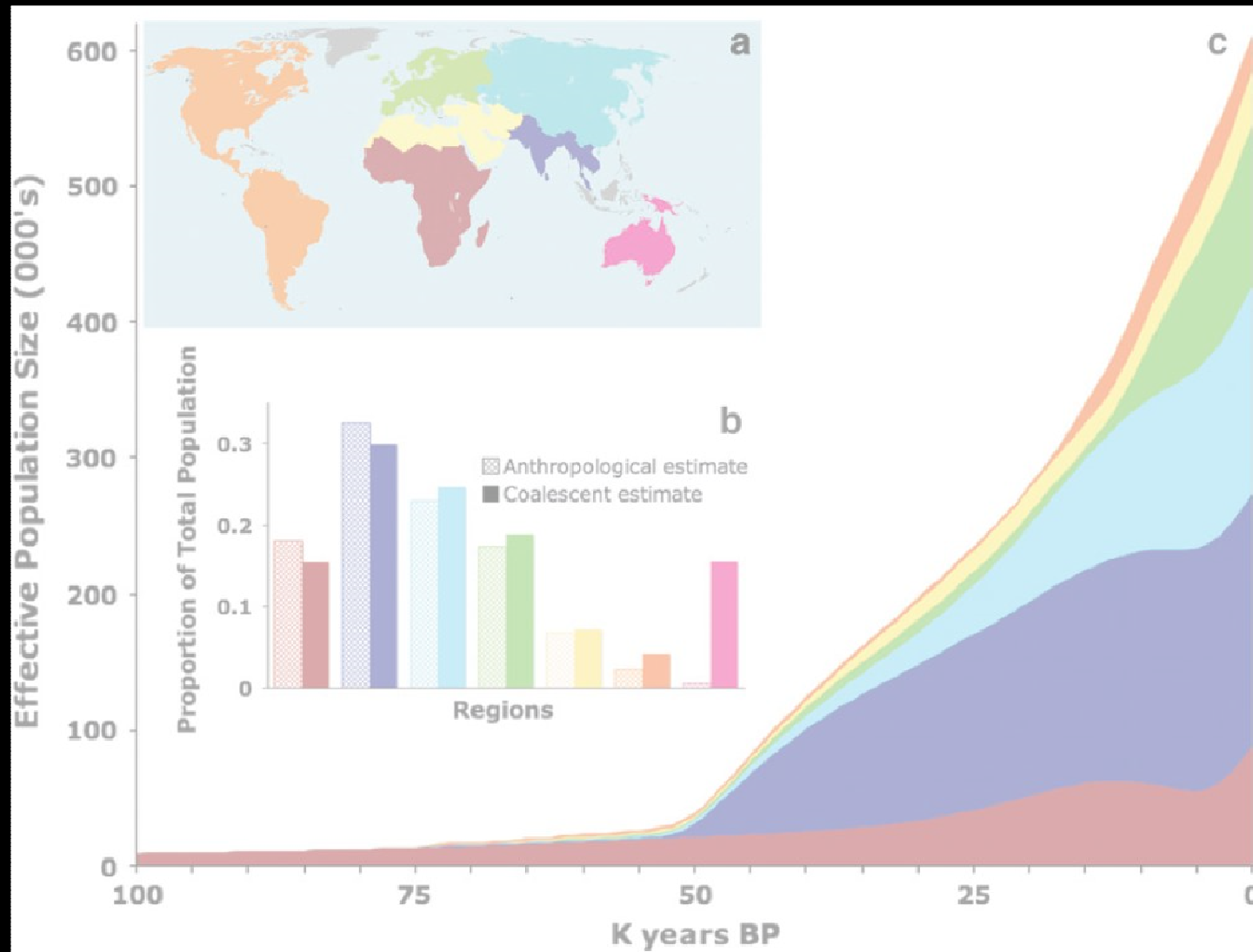


FOOD WEBS

- *Food Web* is a model that shows all the possible feeding relationships between organisms living in an ecosystem.
- A food web is much more complex than a food chain. It is actually several food chains linked together.



Populations: Relations and Effects



Competition for Limited Resources

- Food is a resource animals *must* have to survive. Because most ecosystems have limited supplies of food and other resources, there may be ***Competition***, or contest, among organisms for these resources.
- Camouflage, for example, help animals compete for limited food resources. Animals also compete for water, shelter and mating.
- Every organisms has adaptations that help it compete for resources, because if an organism competes successfully for resources, it is more likely to survive and reproduce.



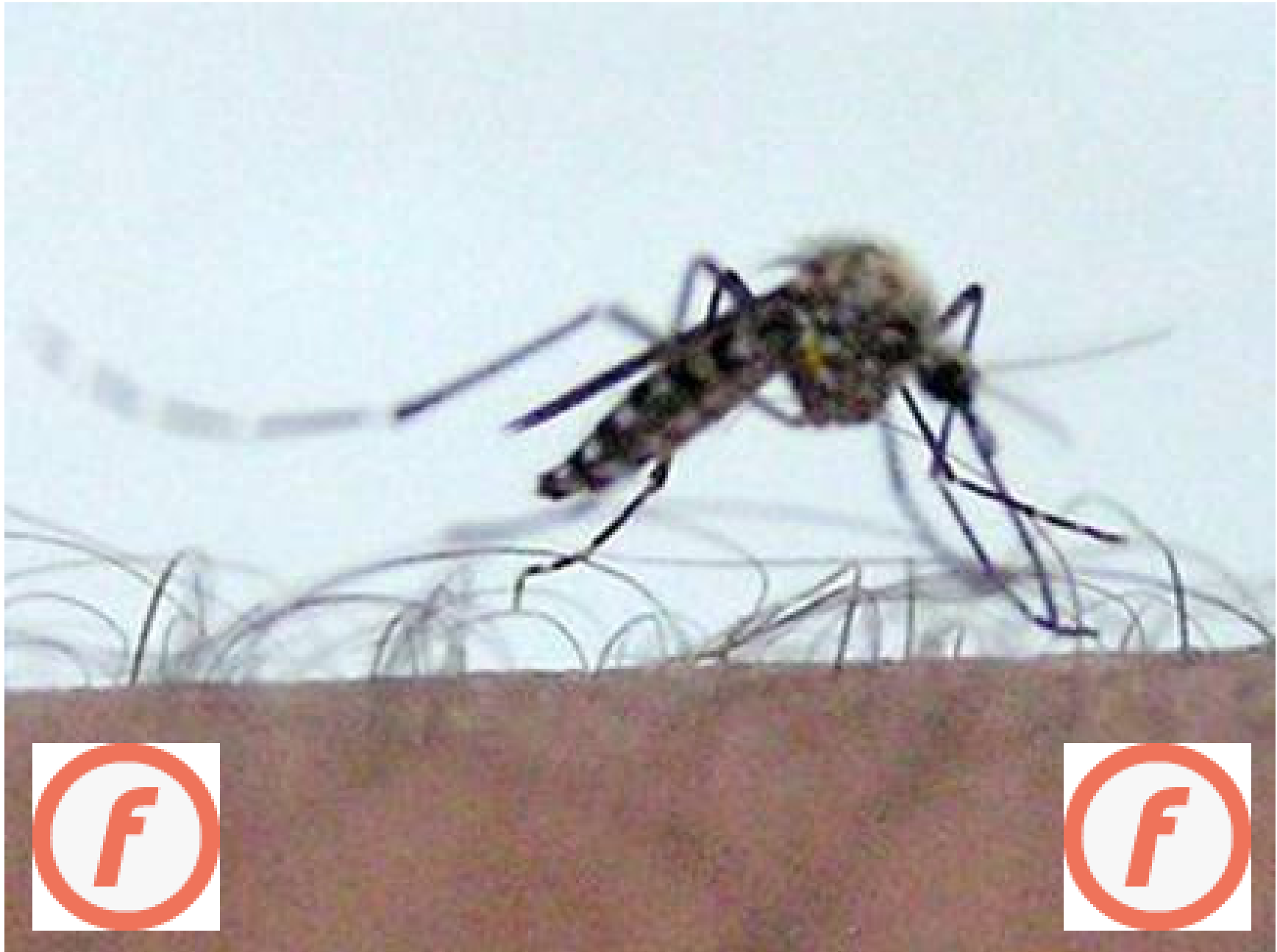
Types of relationships among living things

- ***SYMBIOSIS***, is a type of long-term relationship between different kinds of organisms, that may benefit both organisms, or only one organisms but not the other.
- When *both* organisms benefit, it is called ***Mutualism***.
- ***PARASITISM***, is the type of relationship when one organism benefits and the other gets hurt or damaged.

SYMBIOSIS

PARASITISM





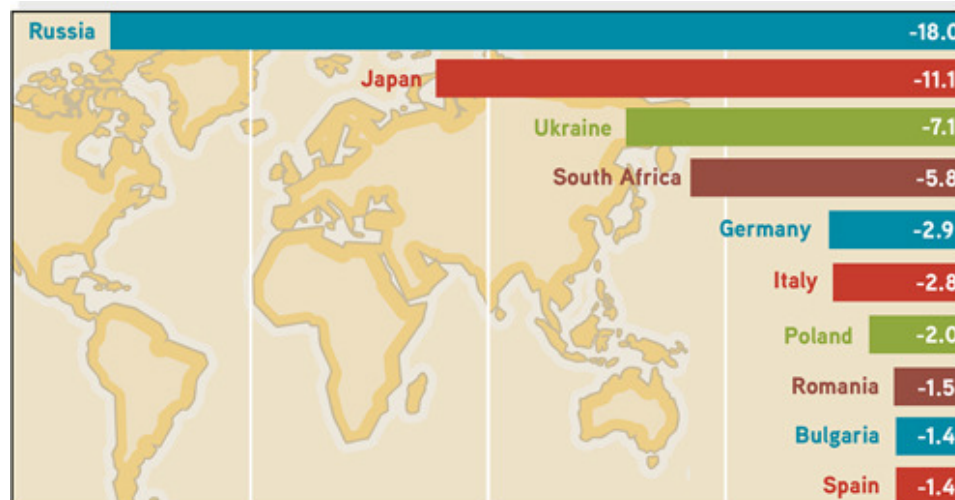
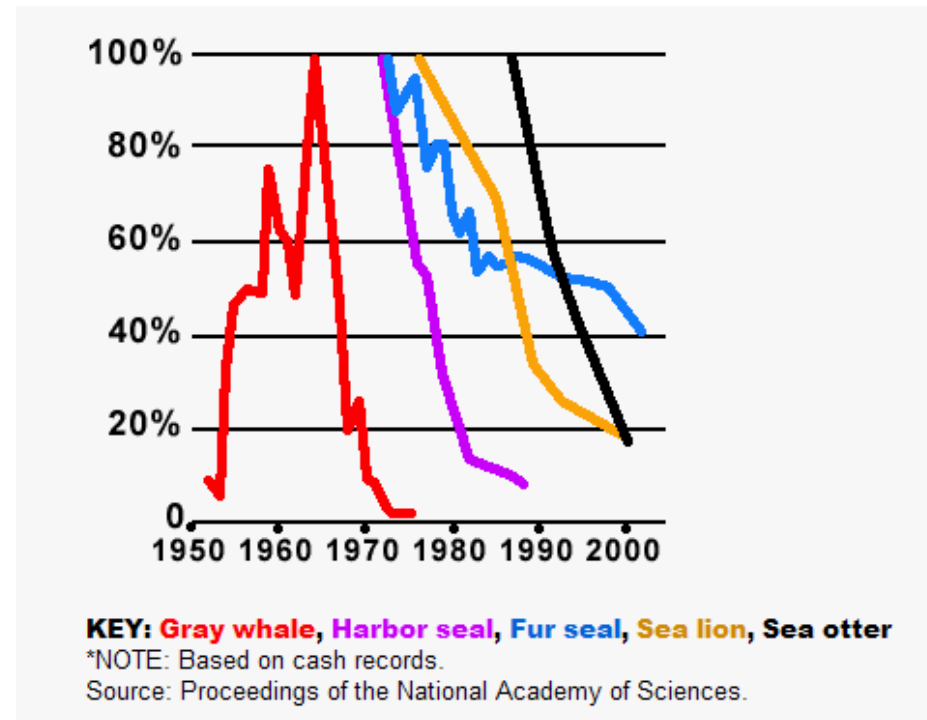
Instinct and Learned Behaviors

- Some behaviors are inherited and some are learned.
- An *instinct* is a behavior that an organism inherits, or that is born with. An instinct is not unique to an individual, instead, it is shared by the entire population.
- Many animals show *learned behaviors*, which are behaviors that have been learned from parents or by observing other organisms.



Population Decline

- Most declines in populations are caused by human activity. In some places, hunting exotic animals to sell them is one of the main causes of declines in populations of certain animals.
- Natural events that change the environment, such as floods, fires, or droughts, also cause populations to decline. However, most natural changes are temporary, and healthy populations usually survive.
- But that is often not the case with changes caused by human activity.



Extinction is Forever

- A population of organisms can only survive if there are enough individuals to produce healthy offspring.
- As a result, some organisms become *extinct*. That is, the last individual in the population dies, and the organism is gone forever.
- A number of natural processes cause extinction: such as climatic disasters (ice ages, severe droughts), or other factors (diseases, asteroids).



On the Road to Extinction

- Organisms listed as *endangered* have populations so small that they are likely to become extinct if steps to save them aren't taken right away.
- Organisms listed as *threatened* are likely to become endangered if they are not protected.





What are Biomes?

Earth's Biomes

- A **Biome** is a large-scale ecosystem. Its climate and the plants and animals adapted to living there in that climate are what make it different from other biomes.
- A **Climate zone** is a region in which yearly patterns of temperature, rainfall, and the amount of sunlight are similar throughout.
- Earth has six major types of biomes: *tropical rain forest, deciduous forest, grassland, desert, taiga and tundra*.
- Each type of biome occurs in several places on Earth.



Deciduous Forest



Grassland



Taiga



Tropical Rain Forest



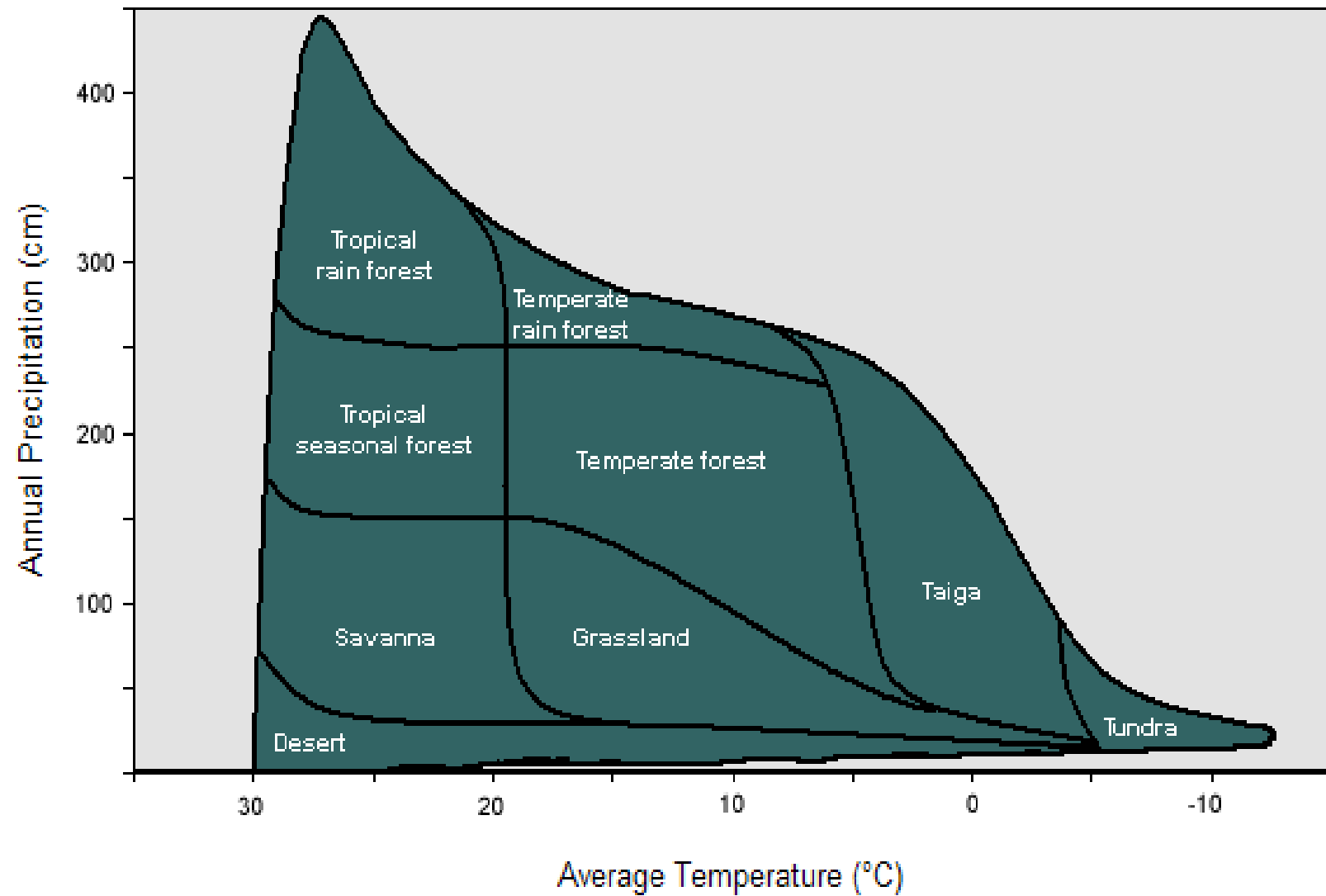
Tundra



Desert

Earth's Biomes

- ***Tropical Rain Forest***, located near the Equator. Warm temperature and rains almost every day.
- ***Deciduous Forest***, moderate temperature and amounts of rainfall. The dominant plants are the trees with deciduous leaves (shed every year, after changing to yellow or orange colors).
- ***Grassland***, moderate temperatures and light rainfall, grasses are the dominant plants. Grasslands play a major role in world agriculture (wheat, corn, rice).
- ***Desert***, high temperatures and very little rainfall. Desert plants and some animals have adaptations to conserve water.
- ***Taiga***, long winters. Dominant plant life, the needle-leaf evergreen trees.
- ***Tundra***, low temperatures and long winters prevent trees from growing. Only smaller plants survive the permafrost, a layer of permanently frozen soil just below the surface.



What are Water Ecosystems?

Saltwater Ecosystems

- Organisms in the ocean have adaptations to help them survive in their ecosystems.
- ***Intertidal zone***: Ocean's edge, where waves constantly lap at the shore and tides rise and fall each day.
- ***Near-shore zone***: Beyond the breaking waves, water extends to about 180 m, with calm water and steady temperature.
- ***Open-ocean zone***: Includes most of the ocean waters. Water is very deep, but most organisms live near the surface. Presence of *phytoplankton* and *zooplankton*.

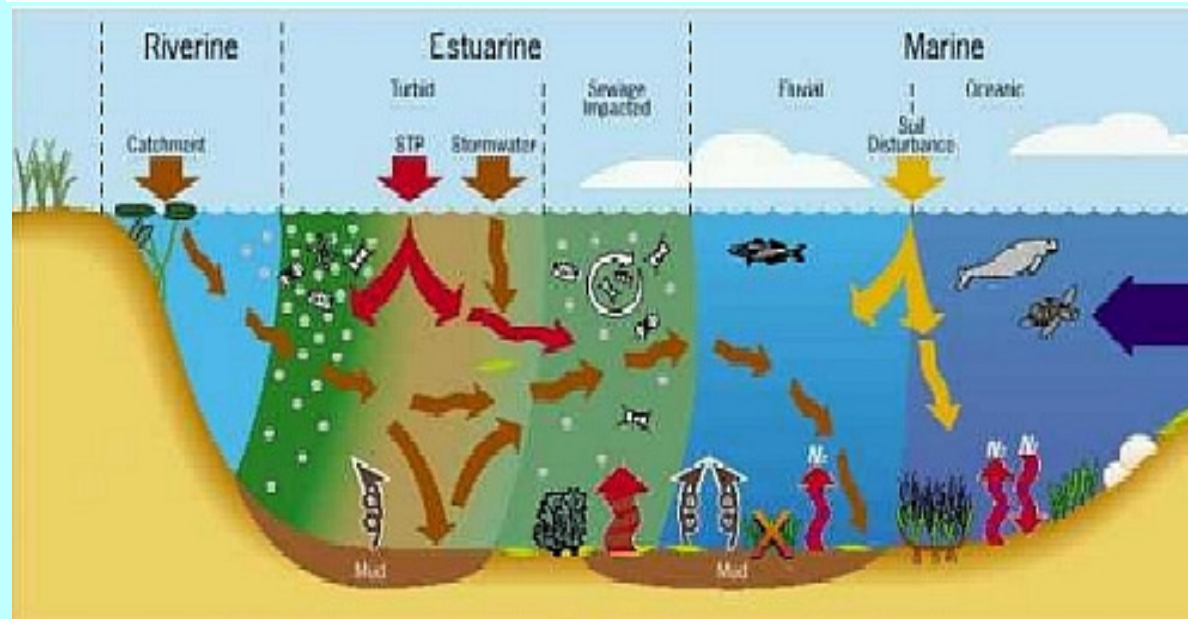
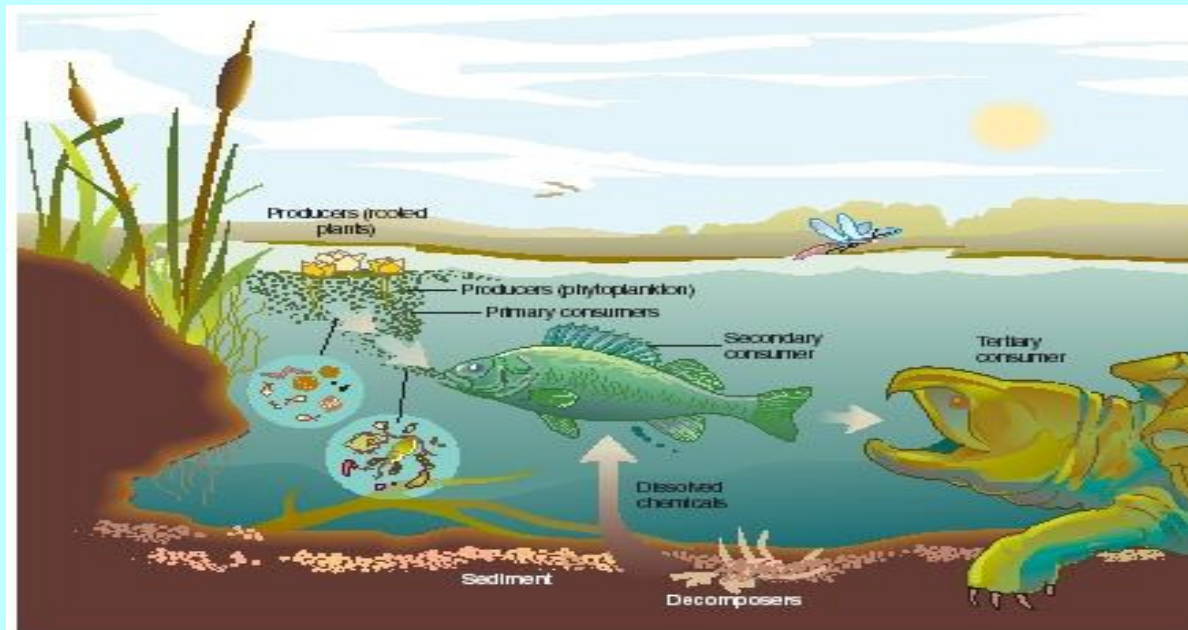


Freshwater Ecosystems

- Lakes, ponds, streams, rivers, marshes, and swamps.
- the plants and animals in these ecosystems are adapted to life in fresh water only.
- Water temperature and the speed at which the water moves determines the kinds of organisms that live in a freshwater ecosystem.

Estuaries

- Brackish water is a mixture of saltwater and freshwater. It is usually found in an ***Estuary***, a place where a freshwater river empties into an ocean.
- All estuaries have changing water conditions.
- Organisms in estuaries have adaptations that allow them to survive in both freshwater and saltwater.
- Light penetration in water along with a large amount of nutrients, make the estuary an ideal habitat for plants and animals.

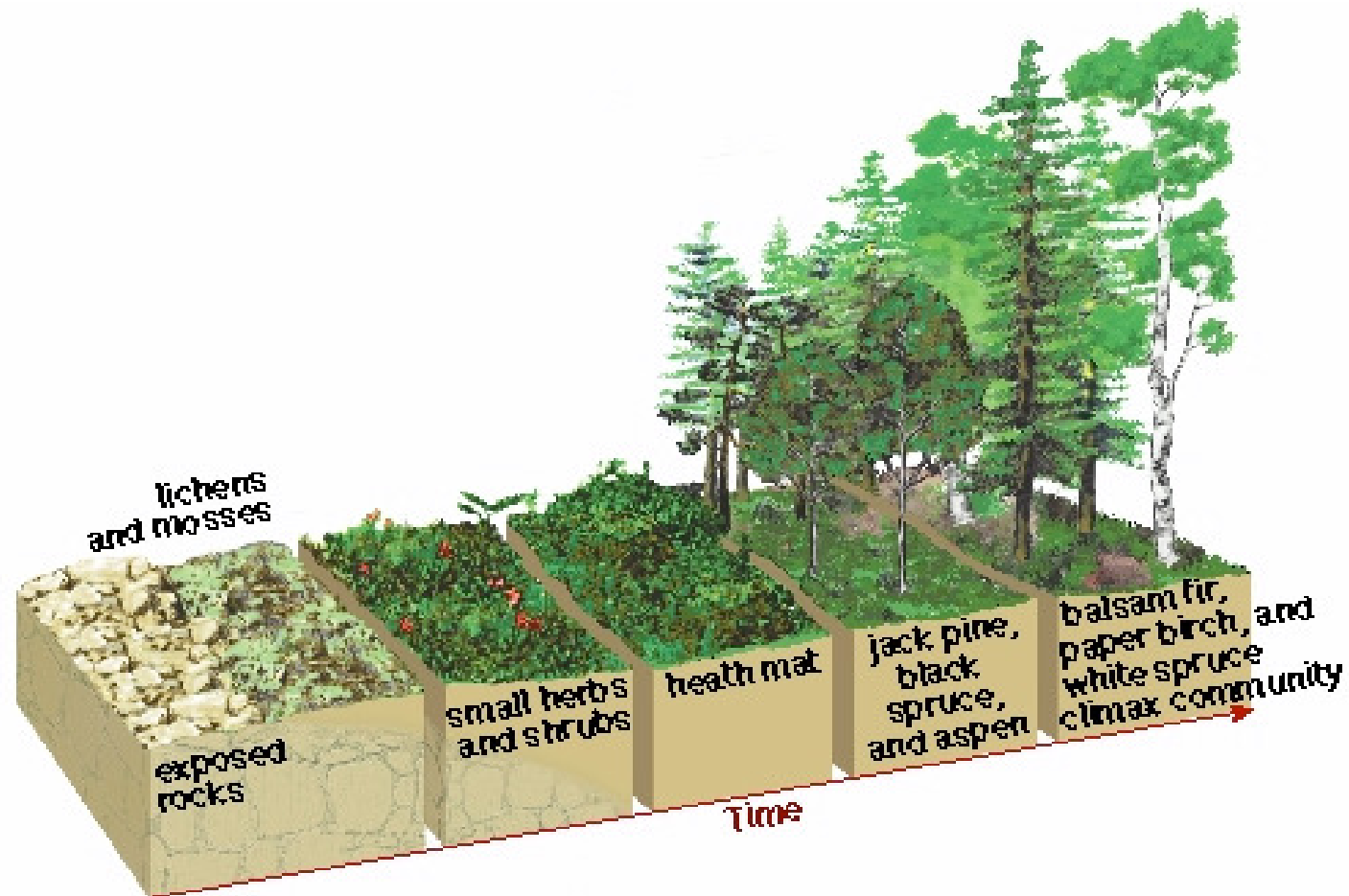


*How do Ecosystems
change naturally?*

Primary Succession

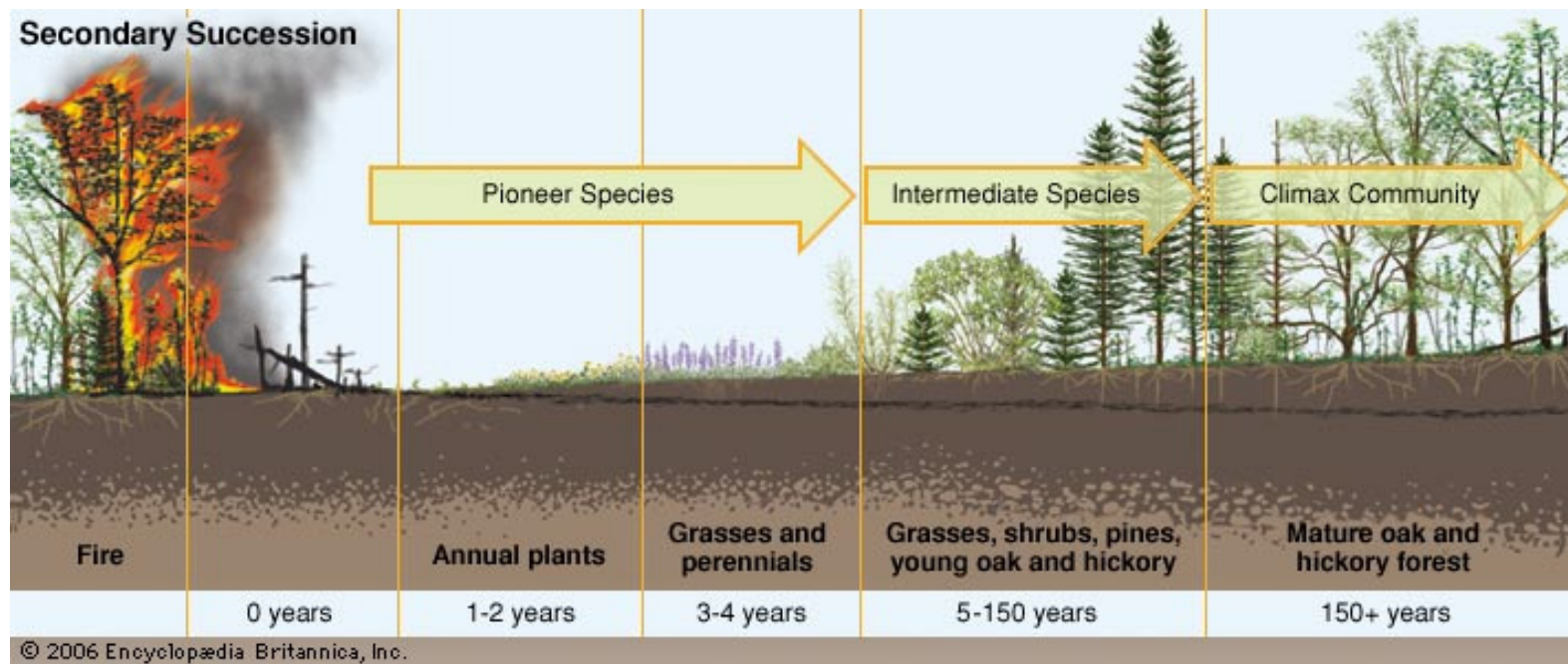
- **Succession**, is the gradual change in an ecosystem, sometimes occurring over thousands of years. There are two types of succession.
- **Primary succession**, occurs on bare, newly formed land. The **pioneer plants** are the first plants to invade a bare area. Their sprouting and growth begins the process of succession.
- Succession is divided in stages:
 - 1st: *Pioneer plant stage* (lichens leave nutrients in the soil when they die);
 - 2nd: *Mossy stage* (sprouting of nonvascular plants);
 - 3rd: *Grassy stage* (the soil is deep and rich enough to support bigger plants).
- The **climax community**, is the last stage of succession.

Primary Succession



Secondary Succession

- **Secondary Succession**, is the return of a damaged ecosystem to its natural climax community, usually after a natural disaster.
- Fires are another type of natural disaster that changes ecosystems.
- Unlike volcanic eruptions, fires actually speed up the process of secondary succession.



*How do people
change Ecosystems?*

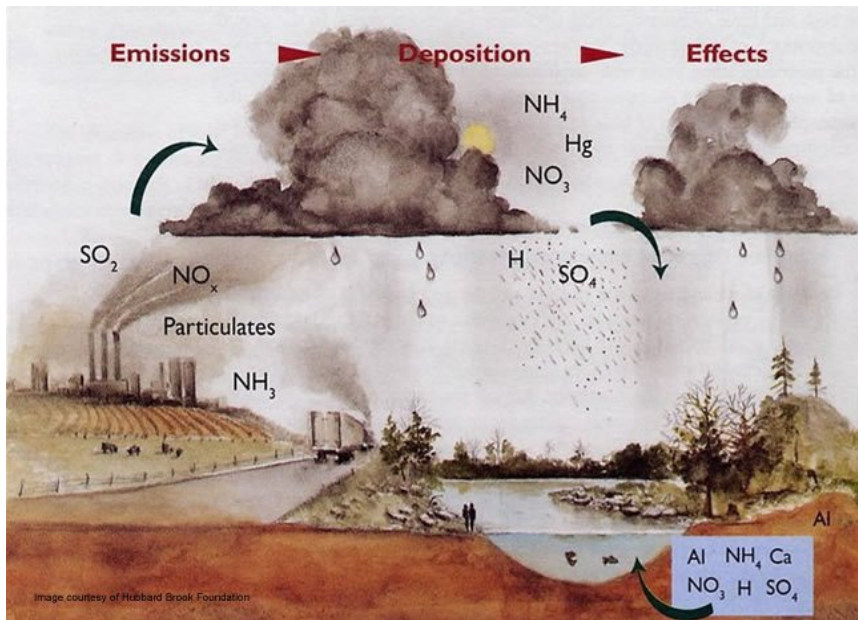
Catastrophic Changes

- A way to get rock and mineral resources from the ground is by strip mining. In this process, the soil is removed until the resource is reached. Strip mining destroys all the communities and many of the abiotic factors from an ecosystem.
- It is impossible for humans to be part of an ecosystem and not affect it. But people can live in ways that do less damage to natural ecosystems.



Damaging Ecosystems

- Farming is vital to human survival. The growing human population increases the demand for food . This demand results in methods of agriculture that include the use of fertilizers, pesticides and herbicides.
- In addition to farming, other human activities damage natural ecosystems; such as deforestation, to cover the needs for space and wood; manufacturing things produces wastes.
- Some waste products damage ecosystems killing organisms and breaking food chains, this is called ***pollution***.
- Factories produce gases (nitrogen and sulphur oxides) that are released into the atmosphere, when water vapor mixes with these gases the condensation and rain formed contains acid, and is called ***acid rain***.



*How can people treat
Ecosystems more
wisely?*

Using Resources wisely

- Changing human habits that damage ecosystems is just as important as passing new laws.
- Everyone can help protect ecosystems by saving, or **conserving**, resources.
- The three Rs: *reduce*, *reuse* and *recycle*.
- **Reduce** means to cut down on the use of resources (water, heaters, air conditioning, etc).
- **Reuse** means not to throw away items that can be used again.
- **Recycle** means to recover a resource from an item and to use the recovered resource to make a new item. Many resources can be conserved by recycling.
- Like reducing and reusing, recycling protects ecosystems from damage or destruction.
- Saving resources helps reduce the use of energy, a very important fact for our planet. Why?



REDUCE

REDUCE WASTE OR THE NEED TO RECYCLE BY
NOT CREATING IT IN THE FIRST PLACE

REUSE

REUSE MATERIALS BEFORE
RECYCLING OR DISCARDING

RECYCLE

TRANSFORM MATERIAL INTO
ANOTHER USABLE MATERIAL

TREATMENT

REDUCE VOLUME
OR TOXICITY

DISPOSAL

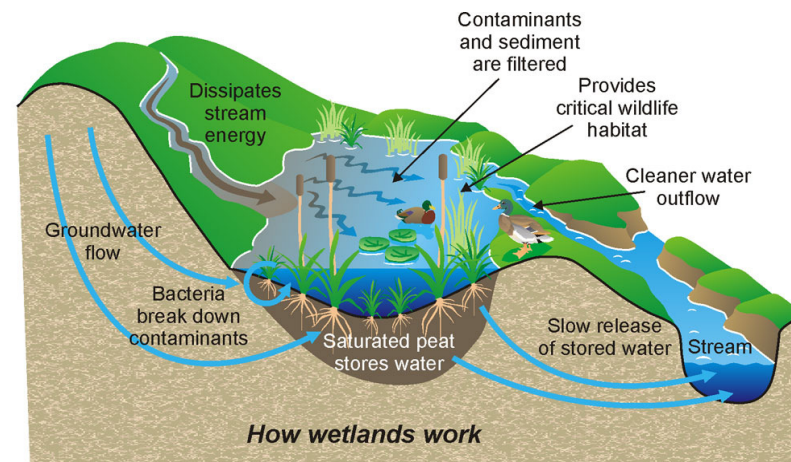
STORE OR BURY
WASTE



*How can people help
restore damaged
Ecosystems?*

Restoring Ecosystems

- The process of restoring a damaged ecosystem is called **Reclamation**.
- Within the past 20 years, reclamation has occurred in many places. However, restoring most ecosystems takes a long time and a tremendous amount of work.
- Water ecosystems, such as the **wetlands**, provide habitats for marine organisms. They also act as natural filters that purify water.
- But 80% of the wetlands in the USA are already gone.
- What about your country? Have you ever visited the wetlands?



Teacher's Notes

This class has been designed to cover the topics of *Ecology* from Monday, August 8th till Friday, August 12th.

For further knowledge about this topic:

1. Conduct a thorough search under the topic: *Ecology* on the Web, books and magazines.
2. If findings are not specific, ask your teacher for suggestions.

BACK

Objectives

- Understand the interaction of the Natural Cycles and the elements of life.
- understand the basic definitions of Ecology: Ecosystem, habitat, niche, competition.
- Identify and describe the characteristics of the types of biomes.
- Describe how ecosystems change over time.
- Identify the ways to protect and recover damaged ecosystems.

Note: All, or most, of the objectives will be covered during class time, however the student must be responsible for those objectives not covered or concluded.

BACK

Vocabulary

- Ecosystem:
- Habitat:
- Niche:
- Symbiosis:
- Competition:
- Neutralism:
- Parasitism:
- Commensalism:
- Mutualism:
- Biome:

***Note:** Most of the vocabulary words will be covered during class time, however the student must be responsible for those words not covered or concluded.*

BACK

Link and Learn

You can visit the following websites to improve your understanding on the present topic:

- <http://science-altair.wikispaces.com>
- <http://learningandscience.blogspot.com>

BACK

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BACK